BELLCOMM, INC.

SUBJECT: Comments on Apollo Flight Operations Documentation Data Package, October 1964 - Case 214

DATE: December 2, 1964

FROM: R. W. Sears

Mr. J. K. Holcomb:

The attached comments on the "Apollo Flight Operation Documentation Data Package" were prepared by P. L. Havenstein in response to your request at the last meeting of the Joint Operations Group. He takes a somewhat different view of program and mission documentation based on responsibilities assumed to be forthcoming for the new Mission Operations Director. It is hoped that these comments may be of use in your continuing efforts to clarify and systematize the operational documentation. We will be glad to discuss the areas covered above at your convenience.

Paul Havenstein
for R. W. Sears

2023-PLH-bd

Copy to
Messrs. T. A. Keegan - NASA/MA-2
J. T. McClanahan - NASA/MAO
I. Susson - NASA/MAO

J. A. Hornbeck
I. M. Ross
T. H. Thompson
J. M. West
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Attached:
Memo entitled "Comments on Apollo Flight Operations Documentation Data Package, October 1964" by P. L. Havenstein dated 12/1/64

BELLCOMM, INC.

SUBJECT: Comments on Apollo Flight Operations Documentation Data Package, October 1964 - Case 214

DATE: December 1, 1964

FROM: P. L. Havenstein

ABSTRACT

The "Apollo Flight Operations Documentation Data Package - October 1964" was presented to the Joint Operations Group by J. K. Holcomb and comments were requested. This memorandum expresses the principle that, within operations, program documentation should be consistent with program responsibilities and mission documentation with mission responsibilities. The general and specific comments are addressed to this principle and in addition to a further departure from the "range-range user" concept inherited from the Department of Defense.

WORKING PAPERS

BELLCOMM, INC.

SUBJECT: Comments on Apollo Flight Operations Documentation Data Package - October 1964 - Case 214

DATE: December 1, 1964

FROM: P. L. Havenstein

MEMORANDUM FOR FILE

Introduction

The Apollo Flight Operations Documentation Data Package goes a long way toward clarifying both program and mission documentation required for Apollo and drops major portions of the "range-range user" documentation inherited from the Department of Defense. Both program documentation and mission documentation are reexamined below to determine if there are useful comments for further clarification.

Program Documentation

Program Documentation of interest to operations, such as "Program Operational Support Requirements," are derived principally from a view of the headquarters organizational responsibilities and authorities. Because proposed changes in this area have not been approved, they are assumed to be as shown in Figure 1.

The three headquarter's directors of interest are: Apollo Program, Mission Operations and Office of Tracking and Data Acquisition (OTDA). The systems of interest are that portion of the Apollo Systems involved in a mission, both flight and ground, subdivided into eight general system areas. Each area has been chosen to include not only the operational hardware but also the associated training equipment, logistics, operating personnel and software (including plans, instructions and other documentation in addition to computer programs).

In the matrix so defined are three types of responsibility and authority and with each there might be associated a type of program documentation as follows:

1. Program Control - This is the final authority and responsibility, at the program level, for all aspects of the program (fiscal, schedule, management, technical, etc.). The implementation or execution of a

program is contained in a Program Development Plan (PDP). If the program is in part a response to the requirements of another group then the PDP is in the same part the response and implementation of those requirements. There appear to be three PDP's for Apollo.

a. Apollo Flight and Launch Systems PDP
b. Apollo Mission Control and Recovery Systems PDP
c. Apollo Network PDP

2. Operational Requirements - This is an expression of the authority and responsibility of the Mission Operations Director to place his views of operational needs in front of those who have program control. The documentation could well be called just Operational Requirements and could be placed on his own program as well as others.

a. Operation Requirements for Apollo Flight & Launch Systems
b. Operational Requirements for the Apollo Network
c. Operational Requirements for Apollo Mission Control & Recovery

3. Support Requirements - This is an expression of the authority and responsibility of the Apollo Program Director to state his view of the requirements imposed by his systems on other programs.

a. Network Support Requirements (Mission Operations must modify and add to this before expressing to OTDA)
b. Mission Control and Recovery Support Requirements

The eight documents identified above are all of the program kind, in the sense that they establish the basis for the balanced allocation of resources to the programs.

Mission Documentation

The hardware, software and personnel which are provided by the programs above are used to conduct a series of Apollo missions. Because there is no purely operational organization as such and most of the personnel is also program personnel, a

formal establishment of an operations organization for each mission is mandatory. The organization so established requires the interleaving and mixing of program personnel both government and contractor at several levels and prior planning and defining of responsibility is a necessity.

Figure 2 shows six headquarters level documents apparently necessary for the missions. It does not seem necessary to exchange requirements documentation for the conduct of missions but rather to seek joint concurrence between program and operations personnel in the direct planning and reporting of missions.

1. Mission Assignment - This document sets the long range program plans for the establishment of required missions.

2. Operations Plan - This document sets forth in general terms the missions and expected mission organizations and permits in this framework the further preparation of individual mission plans.

3. Mission Directive - This document sets forth the objectives which the programs desire to achieve in a mission and describes the operational elements which are made available by the programs. Although there are objectives and elements from the Mission Control and Recovery Program as well as the Network Program, it is felt that the Apollo Program should take the lead in coordinating this joint document.

4. Mission Plan - This document in addition to setting the overall mission organization, procedures and rules includes the plans prepared by each subordinate level of the operations organization and is subdivided, therefore, along operational lines rather than program or administrative lines. It is assumed, for instance, that it would contain a Mission Control Plan, Launch Plan, Recovery Plan, Staff Plan and Flight Plan at the first level and similarly plans for lower levels. This Plan together with the Mission Directive would form the basis of a Flight Readiness Review at which the formal transfer would be made from program to mission status. The differences between Directive and Plan would be resolved in a joint flight readiness memorandum of the Apollo Program Director and Mission Operations Director.

5. Mission Report - This document logically accompanies the return of hardware, software and personnel from operational to program status and serves the purpose of reporting the accomplishment of mission objectives and the recommendations for future operations.

6. Program Report - This document which adds further post-flight analysis to the Mission report is largely historical but may, in addition, be the basis for on-going program decisions.

Specific Comments

With the above general documentation identification based on assumed organizational responsibilities the following specific comments are made on the Data Package:

1. Scope of Operations Activities - Pre-mission

   a. Assurance should include software of all kinds.

   b. Overall Plans should read Complete Plans because they must be put into force at the beginning of the mission period.

2. Scope of Operations Activities (Cont'd) - Mission Period

   a. Emphasize again software.

3. Document Categories and Definitions

   a. These categories still have a large carry-over of "range-range user" relationships and should be modified to the Program and Mission categories described in previous sections of this memorandum.

4. Program Operational Support Requirements Flow Diagram

   a. Figure 1 shows a rudimentary flow which when coupled with the Program Development Plans to complete the response could form the basis of a revised flow diagram.

5. Mission Operational Support Requirements Flow Diagram

   a. Figure 2 shows a rudimentary flow which when coupled with a memorandum report of the Flight Readiness Review would form a simpler mission documentation scheme.

6. Operations Planning Document Flow

   a. Because the Operating Organization is markedly different from the administrative organization,

the identification of any plans as center plans is inappropriate.

b. Although the right hand list of plans is a complete one from a functional point of view, they should be grouped along operations organizational lines. For instance, there should be training plans in both the Crew Flight Plan and Recovery Plan.

c. It is not clear that Apollo Test Requirements play any part in the conduct of a mission although they play a strong part in the conduct of a program.

7. Apollo Program Assessment Flow

a. The Mission Directors Assessment during the mission period should follow the operations organization lines. In other words the assessment of the personnel as well as the hardware and software should be reported by the Launch Director, Flight Director, Recovery Director and Crew Commander for their organizations.

One of the early objectives in the current study of operational documentation was to create a standard format for the presentation of information to both program and operations personnel. It is felt that this can still be accomplished without doing violence to the principal doctrine expressed by these comments: that program documentation should be the servant of program responsibilities and that mission documentation should be the servant of mission responsibilities.

2023-PLH-bd

P. L. Havenstein

Attached:
Figure 1 and 2

Copy to
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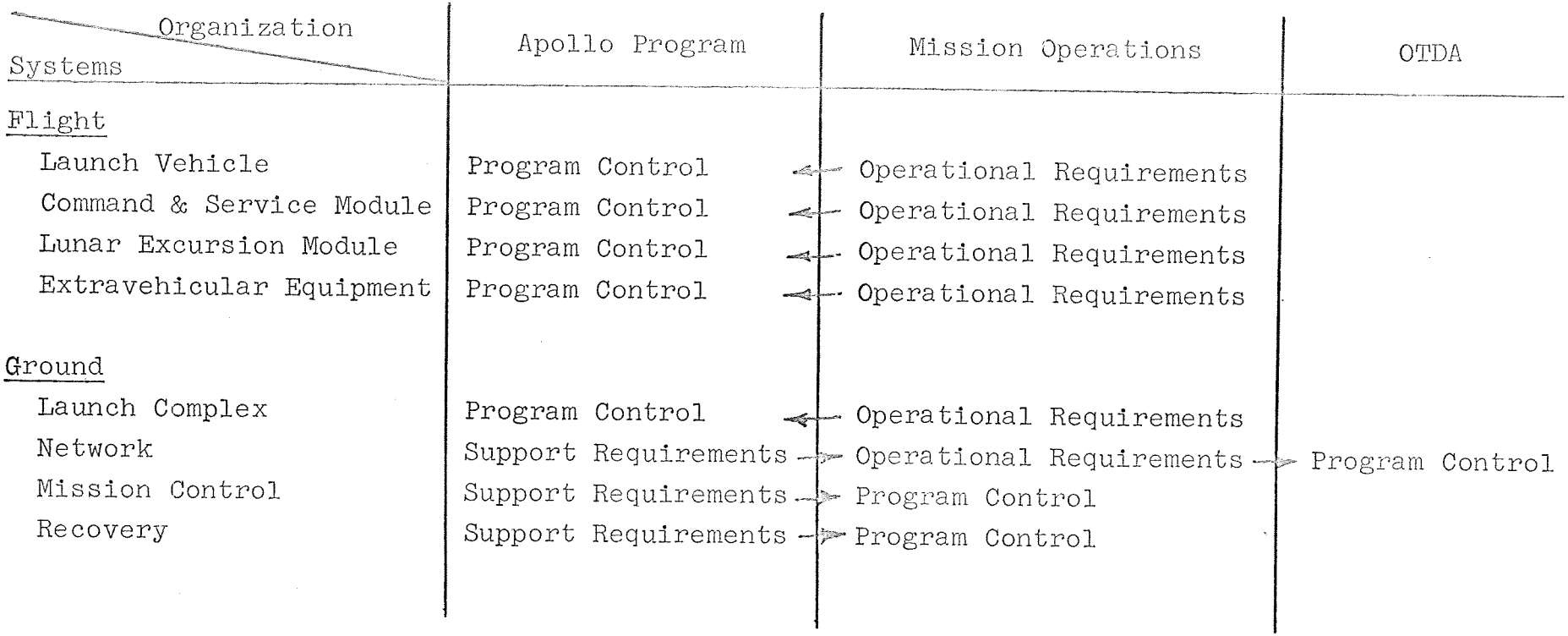
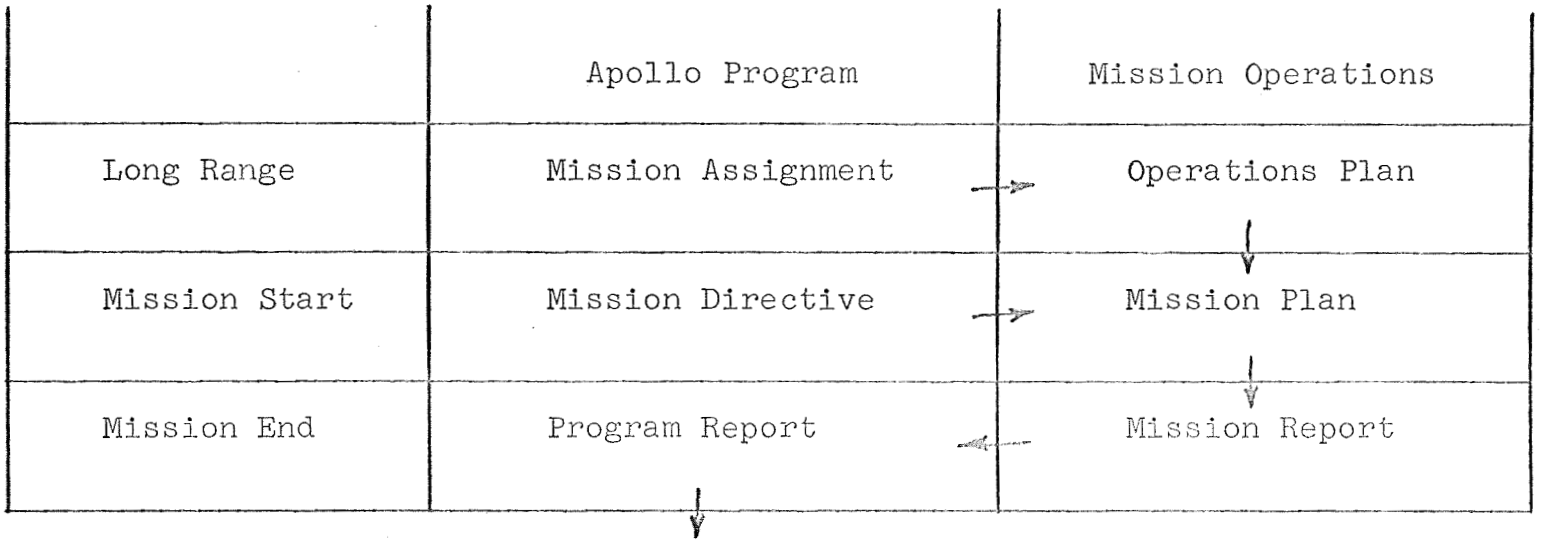


Assumed Headquarters Program Responsibilities and Authorities

Figure 1



Mission Documentation

Figure 2